United States Department of Agriculture | Forest Service | Southwestern Region | 517 Gold Avenue SW. Albuquerque, NM 87102-0084

Reply to: 3420 **Date:** October 20, 1988

Subject: Western Spruce Budworm Biological Evaluation

To: Forest Supervisor, Carson National Forest

During July and August, 1988, Forest Pest Management Specialists monitored and evaluated western spruce budworm (WSB), Choristoneura occidentalis, defoliation and insect densities on the Carson National Forest (CNF). Defoliation was monitored through aerial detection surveys and ground observations and infestation trends by egg mass surveys and ground observations. Western spruce budworm egg mass surveys, used to predict the following years budworm larval densities and defoliation trends, were conducted on portions of the Camino Real, Questa, Canjilon, and Tres Piedras Ranger Districts (RDs) per your request. Results of these surveys, prediction of 1989 infestation and defoliation trends, and management recommendations are summarized in this letter.

Forestwide, WSB defoliation aerially detected on the CNF and adjacent lands of mixed ownerships including the Picuris Pueblo Indian Reservation increased slightly from 168,760 acres in 1987 to 197,330 acres in 1988. As in 1987,the majority of this defoliation (120,940 acres) occurred on the west half of the Forest on the Canjilon, El Rito, and Tres Piedras RDs. Total acres and intensity of defoliation are summarized by ownership in Table 1 and depicted in Figures 1-6.

Camino Real RD--Defoliation on this District increased more than 5-fold from 8,480 acres in 1987 to 46,950 acres in 1988. The majority of this defoliation occurred on the south half of the District on the Cristoval de la Serna, Rancho del Rio Grande, Santa Barbara, Las Trampas, and Francisco Montes Vigil Land Grant Lands (Figures 1 & 2). Many of these areas have experienced some degree of periodic defoliation since 1984.

Egg mass surveys were conducted in the vicinity of U.S. Hill and the Rio Pueblo drainage (Comales Canyon east to La Junta Canyon) where budworm activity relating to visual quality has been an issue in recent years. The results of these surveys (Table 2) indicate impacts to visual quality will be minor in 1989. Defoliation in the vicinity of U.S. Hill is expected to decrease in intensity from moderate (>35 to 65 percent of new growth) to mostly light (>5 to 35 percent of new growth), while in the Rio Pueblo defoliation is expected to remain largely undetectable (<5 percent of new growth). Average densities of egg masses from U.S. Hill were 5.9 per meter square of foliage and 2.6 per meter square for the Rio Pueblo drainage. The low level of budworm activity in the Rio Pueblo area may be the result of the 1987 suppression treatments.

No other areas were sampled on this District. However, based on past infestation trends, we anticipate defoliation of the other infested areas to continue in 1989.

Questa RD--No WSB defoliation was aerially detected on this unit in 1988. However, ground observations, made while collecting egg masses, revealed some defoliation in stands located along Bobcat Pass and the adjacent Beaubien and Miranda Land Grant. Light defoliation was observed north of Red River at the base of Sawmill Mountain. No other areas of defoliation were detected.

Egg mass samples collected near Red River (about 0.5 egg masses per meter square) indicate defoliation will continue to remain largely undetectable in 1989. In recently defoliated stands located along Bobcat Pass where egg masses were higher (Table 2), areas of light to moderate defoliation are predicted for next summer.

Valle Vidal Administrative Unit--Area of defoliation on this unit doubled from 6,720 acres in 1978 to 17,770 acres in 1988 (Figure 4). Many of these areas have been chronically defoliated since 1984. Although no egg mass surveys were conducted on this unit, we anticipate continued defoliation in 1989.

Canjilon RD--WSB defoliation decreased slightly from 7,120 acres in 1987 to 4,900 acres in 1988 (Figure 5). A walk-through examination of Trout Lakes Campground revealed a high incidence of budworm-caused top-kill damage in sapling and pole-sized trees. Additional top-kill damages in this campground, however, are expected to be minor since WSB infestations on this unit appear to be declining based on average estimates of 2.6 egg masses per meter square of foliage this year compared to 15.3 per meter square in 1987. Since infestations in the vicinity of Trout Lakes is at a relatively low level, defoliation is expected to be largely undetectable in 1989.

El Rito RD--Area of defoliation decreased from 67,280 acres in 1987 to 43,800 acres in 1988 (Figure 6). Although no egg masses were collected from this unit, we anticipate continued defoliation throughout the area in 1989.

Tres Piedras RD--Although WSB infestations were suppressed on portions of this District on three separate occasions (1982, 1983, and 1984), moderate to heavy levels of defoliation have been aerially detected throughout the mixed conifer forest cover type since 1986. Defoliation in 1988 (Figure 6) totaled 72,240 acres. In 1986 and 1987, defoliation was detected on 73,796 and 77,280 acres, respectively. Ground observations made along U.S. Highway 64 from the Rio Tusas west to Hopewell Lake revealed a high incidence of budworm related top-kill damages to understory sapling and pole-sized trees near Tusas Mountain and along Hopewell Ridge. Stands exhibiting damages were typically multi-storied, predominantly comprised of Douglas-fir and white fir (ABCO/ERREX habitat type), and very heavily defoliated (mid and upper crowns almost completely devoid of needles). At Hopewell Lake, on the other hand, defoliation was minor and barely detectable.

Egg mass densities collected from twelve locations (Table 2) indicate WSB populations are declining and next year's defoliation level will be mostly light. The average egg mass density decreased approximately 4-fold: 45.8 in 1987 to 11.3 in 1989. Based on these data, area and intensity of defoliation are expected to decrease noticeably along U.S. Highway 64 west to Hopewell Lake. However, areas of light to moderate defoliation will still be evident in 1989.

Based on past defoliation trends, we anticipate defoliation to continue throughout the remaining infested areas for several more years.

Management Alternatives

There are basically two general alternatives for short-term WSB management. These are:

(1) No action.

(2) Direct suppression with insecticides.

For the long-term, silvicultural management is an approach that can be used to reduce susceptibility of effectively treated stands to WSB.

Recommendations

For campgrounds, picnic areas, and other high-use visitor sites, we recommend the Forest continue their suppression efforts using ground-based equipment to prevent defoliation of individual trees and protect visual quality. A presuppression survey should be conducted to determine if insect densities are sufficient to warrant treatment.

For the major portion of the outbreak, no action is recommended. These areas include the Camino Real, Canjilon, El Rito, and Tres Piedras RDs, and the Valle Vidal Administrative Unit. Since WSB populations currently exceed recommended treatment thresholds, and permanent tree damages have already occurred, we no longer believe direct suppression with insecticides would be practical, economical, or contribute to the achievement of current management objectives.

Where opportunities exist to reduce stand susceptibility to future outbreaks through the long-term, silvicultural treatments are recommended where the opportunity exists to reduce the effects of future WSB outbreaks.

Douglas L. Parker

DOUGLAS L. PARKER
Director of Forest Pest Management

Enclosures (8)

cc:
BIA, Albuquerque
Santa Fe NF
Robert Cane, NM State Forestry
DRF, RES
DRF, S&PF

Table 1--Acres of WSB Defoliation by Ownership and Intensity, Carson National Forest, 1988

Ownership	Light	Moderate	Heavy	Total
Carson NF				
Camino Real RD	32,310	14,640	0	46,950
Canjilon RD	480	3,700	720	4,900
El Rito RD	15,560	21,600	6,640	43,800
Questa RD	0	0	0	0
Tres Piedras RD	16,960	41,920	13,360	72,240
*Valle Vidal Unit	5,030	6,760	5,980	17,770
Jicarilla Apache IR	0	50	1,680	1,730
Picuris IR	600	220	0	820
Adjacent State and Private	4,800	4,320	0	9,120
Total	75,740	93,210	28,380	197,330

* Administered by Questa RD

Table 2--Egg Mass Survey Results, Carson National Forest, 1988

Plot	Locale	EM/M^2	1989 Prediction
Camino Real RD			
U.S. Hill			
1 -	Turkey Park	16.1	
2	Turkey Park	6.1	
3	FS Road 439	4.5	
4	FS Road 439	9.27	
5	FS Road 439	8.8	
6	FS Road 439	.7	
7	FS Road 439	2.5	
8	FS Road 439	3.5	
9	U.S. Hill Overlook	8.7	
10	FS Road 442	3.1	
11	FS Road 442	1.6	
12	FS Road 442	6.1	
12 Plots	U.S. Hill Area $\bar{X}$ =	5.9	(S.E. 1.2) Light to Moderate
Rio Pueblo Drainage			
13	Comales Campground	7.4	
14	Comales Canyon	2.6	
15	Comales Canyon	0.7	
16	Sipapu Ski Area	1.1	
17	Sipapu Ski Area	0.9	
18	Flechado Canyon	3.3	
19	Aqua Piedra	2.2	
20	La Junta Canyon	2.5	
8 Plots	Rio Pueblo $\bar{X}$ =	2.6	(S.E. 0.8) Undetectable to Light
Questa RD			
1	Upper Red River Canyon	0.0	
2	Upper Red River Canyon	0.9	
3	Upper Red River Canyon	0.0	
4	Upper Red River Canyon	0.7	
5	Upper Red River Canyon	0.0	
10	Red River	1.5	
11	Red River	0.8	
7 Plots	Red River $\bar{X}$ =	0.5	(S.E. 0.2) Undetectable
Red River			
6	Old Bobcat Pass	2.2	
7	Old Bobcat Pass	10.3	
8	Old Bobcat Pass	4.9	
9	Old Bobcat Pass	10.8	
4 Plots	Bobcat Pass $\bar{X}$ =	7.1	(S.E. 2.1) Light to Moderate

Table 2--Egg Mass Survey Results, Carson National Forest, 1988, Cont'd

Plot	Locale	EM/M^2		1989 Prediction
Canjilon RD				
1	Trout Lakes	3.2		
2	Trout Lakes	2.0		
2 Plots	Trout Lakes $\bar{X}$ =	2.6	(S.E. 0.6)	Undetectable
Tres Piedras RD				
1	Cunningham RD	10.3		
2	Cunningham RD	6.7		
3	Tusas Mt.	8.2		
4	Hopewell Ridge	9.3		
5	Hopewell Ridge	13.7		
6	Burned Mt.	14.1		
7	Duran Canyon	11.3		
8	Biscara Cañada	6.9		
9	Biscara Cañada	6.6		
10	Broke Off Mt.	16.2		
11	Broke Off Mt.	11.1		
12	Broke Off Mt.	21.6		
12 Plots	Hwy 64 to Hopewell Lake $\bar{X}$ =	11.3	(S.E. 1.3)	Light to Moderate

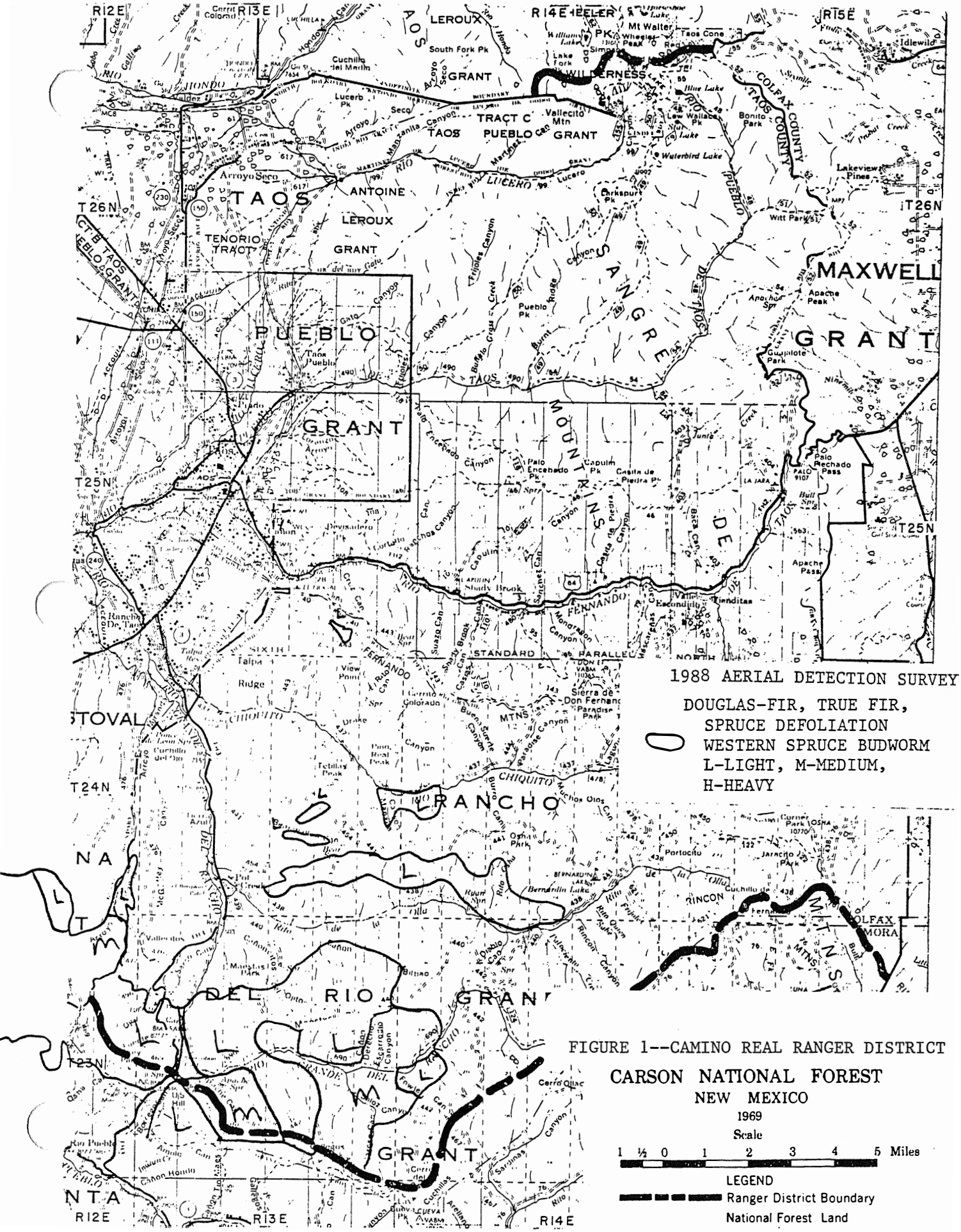


FIGURE 1--CAMINO REAL RANGER DISTRICT

1988 AERIAL DETECTION SURVEY

DOUGLAS-FIR, TRUE FIR,
SPRUCE DEFOLIATION
WESTERN SPRUCE BUDOWRM
L-LIGHT, M-MEDIUM,
H-HEAVY

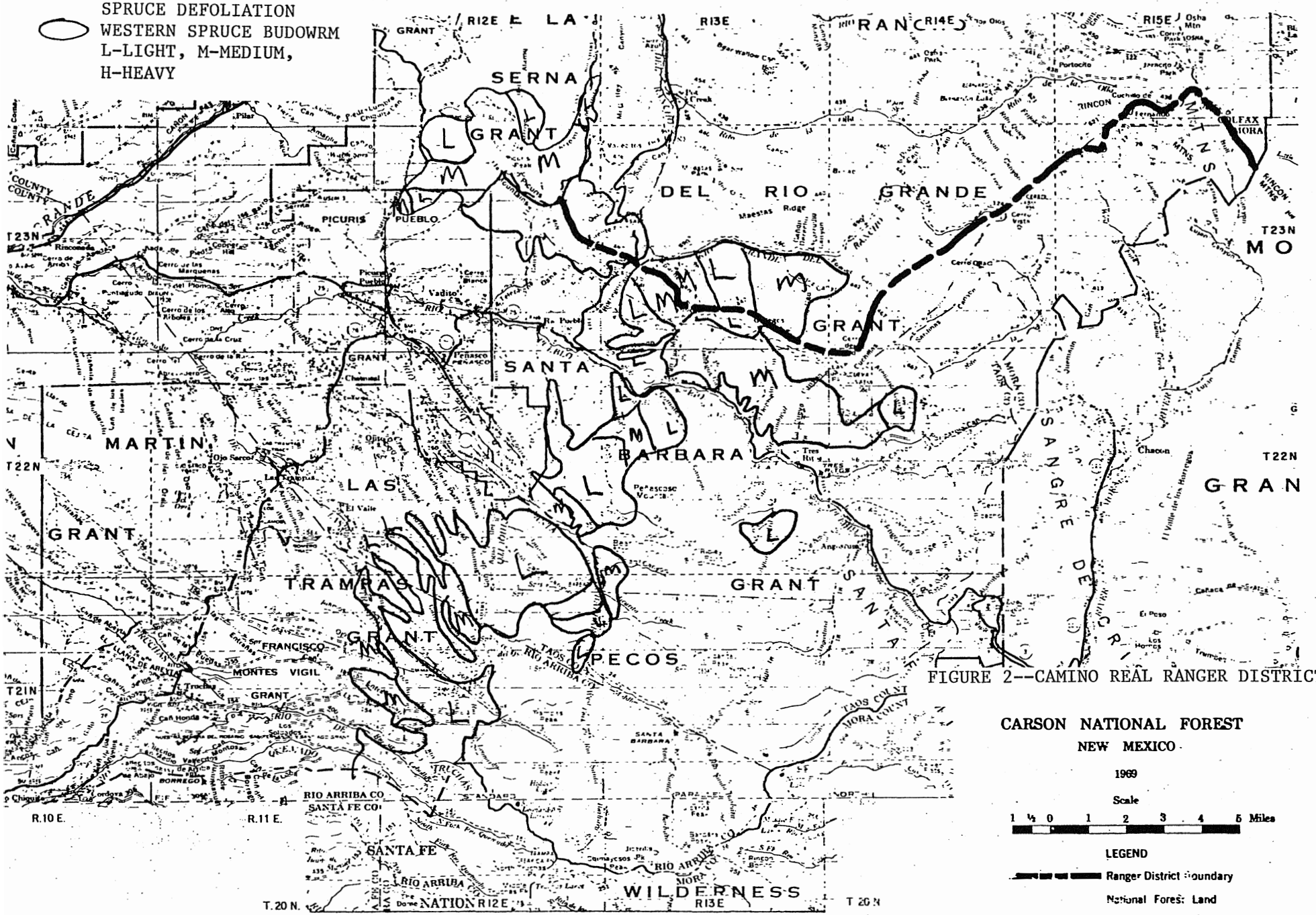


FIGURE 2--CAMINO REAL RANGER DISTRICT

CARSON NATIONAL FOREST
NEW MEXICO
1969

Scale
1 ½ 0 1 2 3 4 5 Miles

LEGEND
Ranger District Boundary
National Forest Land

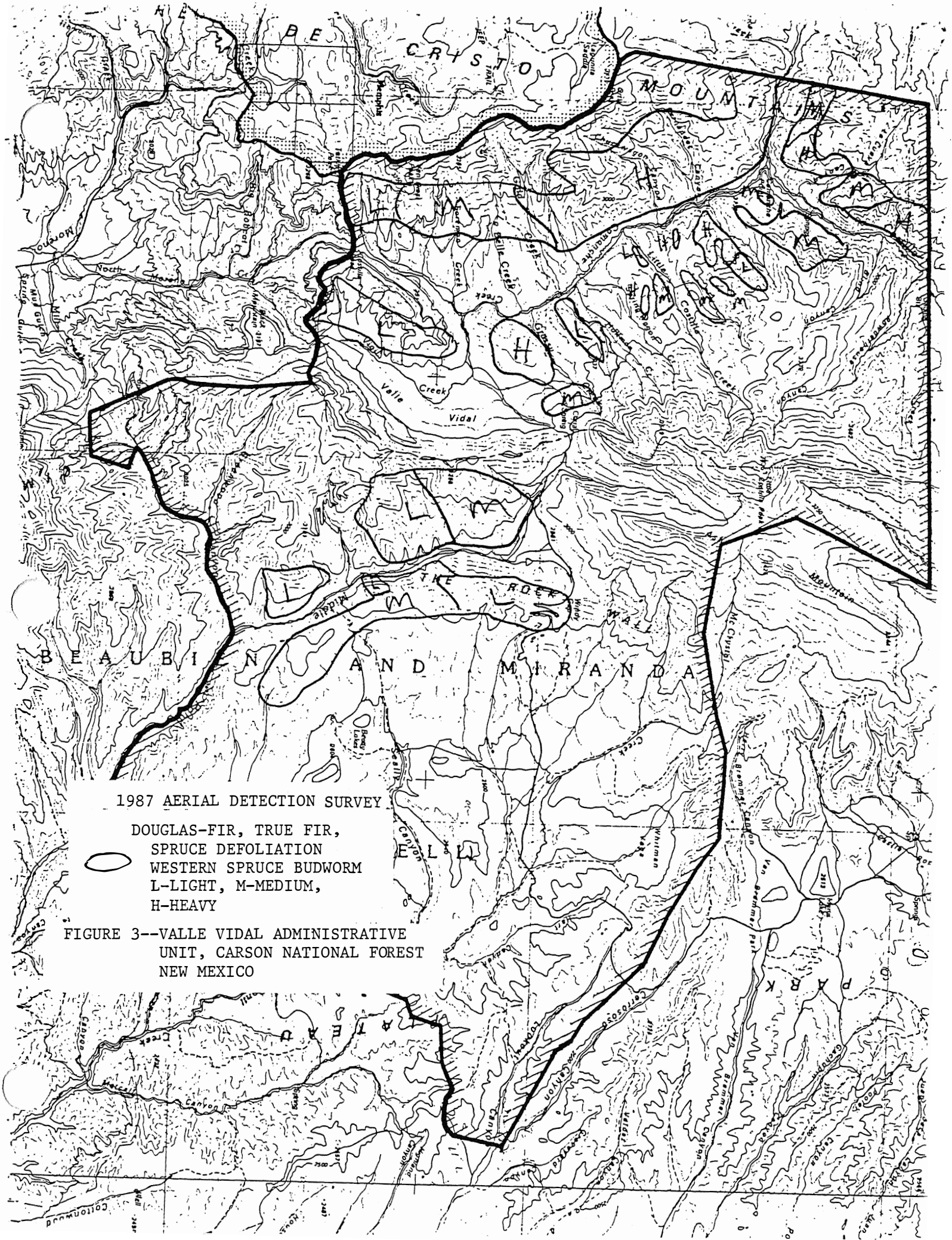
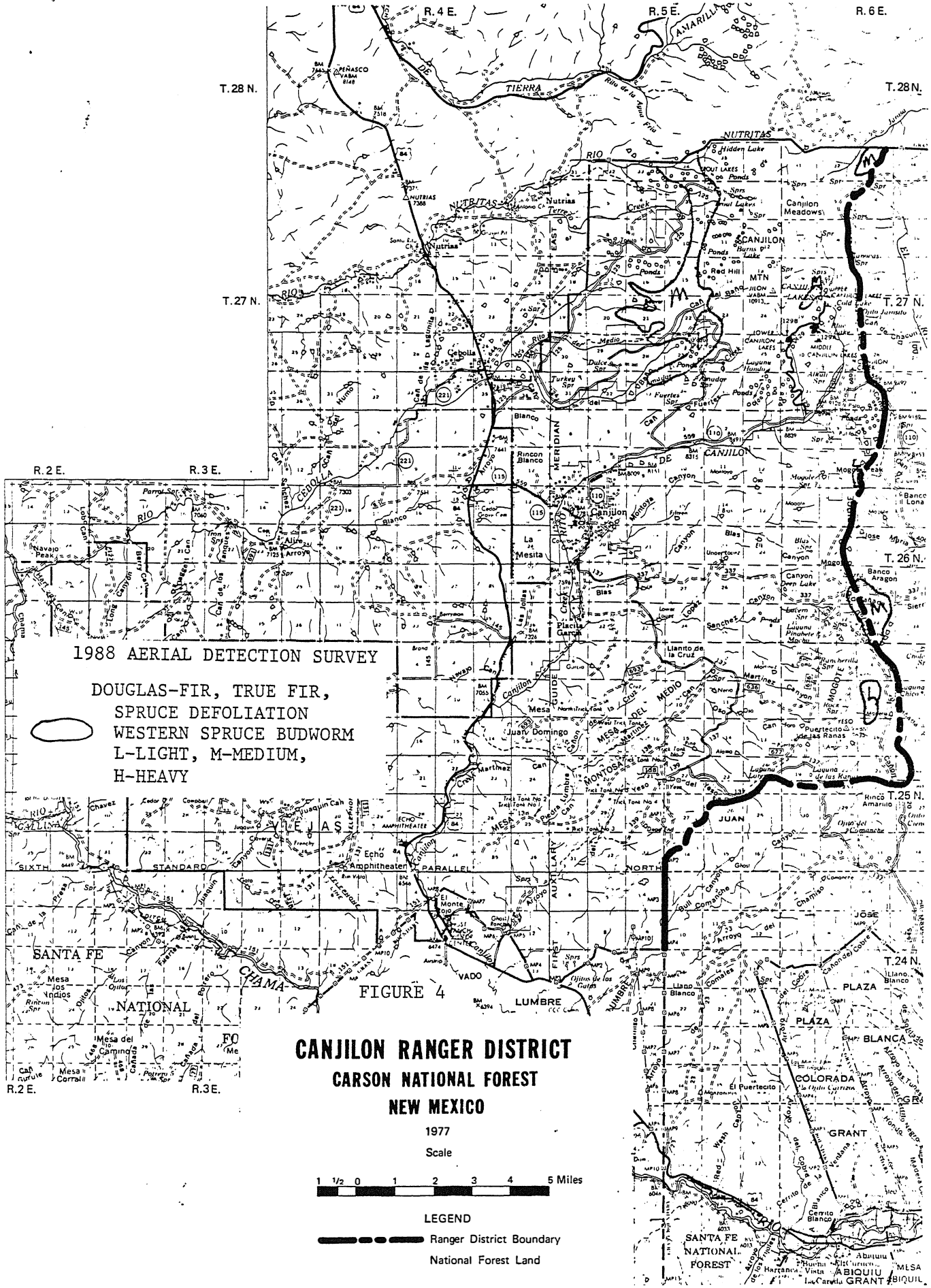
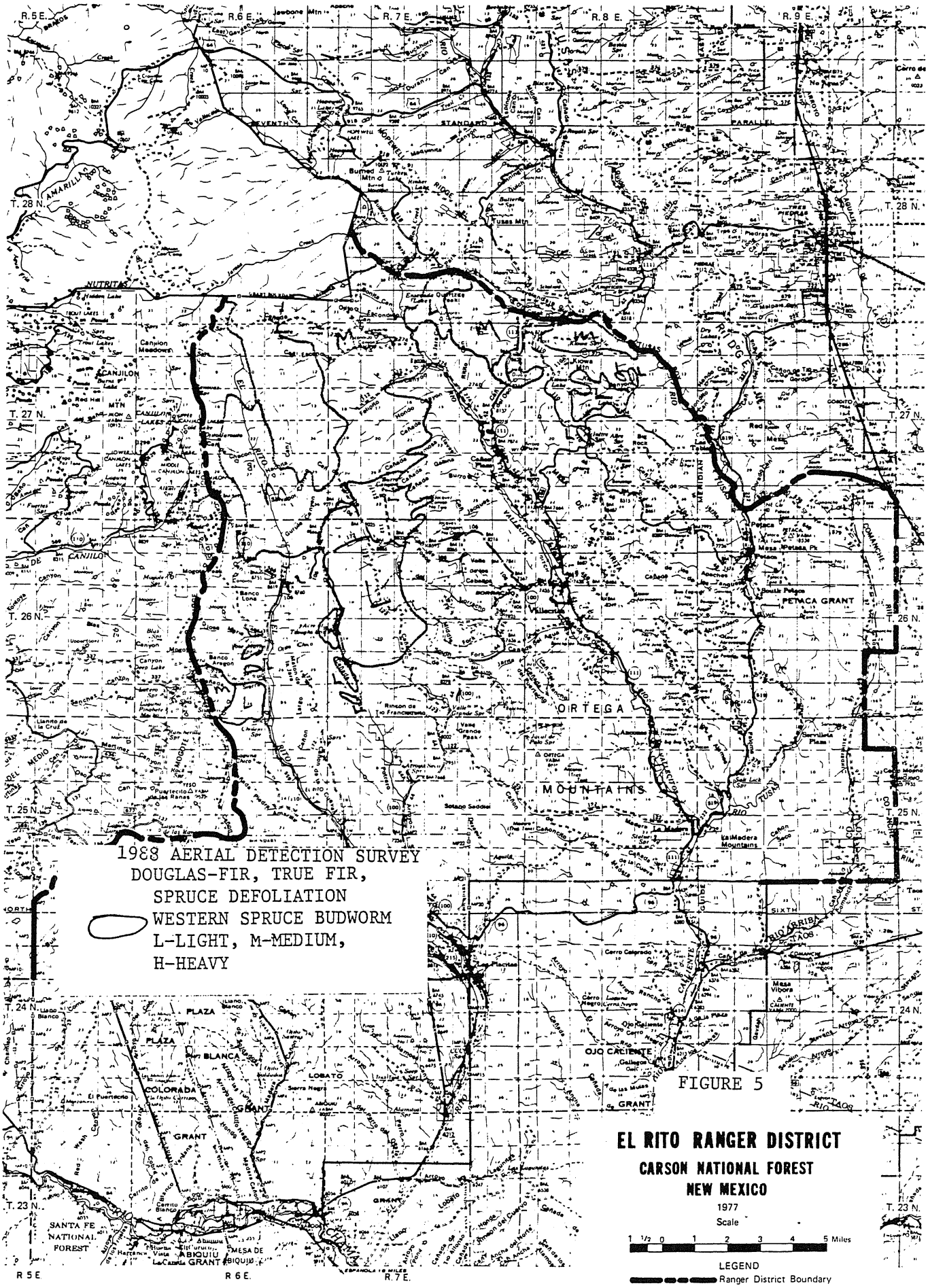


FIGURE 3--VALLE VIDAL ADMINISTRATIVE UNIT, CARSON NATIONAL FOREST NEW MEXICO


R. 4 E.
R. 5 E.
R. 6 E.
T. 28 N.
T. 27 N.
T. 26 N.
T. 25 N.
T. 24 N.
R. 2 E.
R. 3 E.
1988 AERIAL DETECTION SURVEY
DOUGLAS-FIR, TRUE FIR,
SPRUCE DEFOLIATION
WESTERN SPRUCE BUDWORM
L-LIGHT, M-MEDIUM,
H-HEAVY
NUTRIAS
CANJILON
CANJILON MTN
Canjilon Meadows
Red Hill
La Mesita
Rincon Blanco
Juan Domingo Mesa
Echo Amphitheater
El Monte
VADO
LUMBRE
JUAN
JOSE
PLAZA
PLAZA BLANCA
COLORADA
GRANT
SANTA FE NATIONAL FOREST
ABIQUIU
MESA ABIQUIU GRANT
SANTA FE NATIONAL
Mesa del Caminos
Mesa Corralitos
Mesa Los Indios
CHAMA
RIO CHAMA
RIO DE TIERRA AMARILLA
RIO NUTRIAS
RIO CANJILON
RIO MEDIO
RIO CEBOLLA
RIO BLANCO
CANJILON CREEK
NUTRIAS CREEK
EAST CANJILON CREEK
MIDDLE CANJILON CREEK
LOWER CANJILON LAKES
MIDDLE CANJILON LAKES
UPPER CANJILON LAKES
Hidden Lake
Burns Lake
Canjilon Lakes
Mogote Peak
Navajo Peak
Cebolla Mesa
Rincon Amarillo
Banco Aragon
Banco Lona
Puertecito de las Ranas
El Puertecito
Llano Blanco
Cerrito Blanco
Abiquiu
Barranca Vista
Las Carretas
Cebolla Canyon
Canyon del Cobre
Arroyo del Cobre
Arroyo Seco
Arroyo de los Tunos
Arroyo Frijoles
Arroyo Chamisal
Arroyo Cebolla
Arroyo Blanco
Arroyo Mesa
Arroyo Montoya
Arroyo Canjilon
Arroyo Auxiliary
Arroyo Ghost
Arroyo Comanche
Arroyo Cebolla
Arroyo Las Tunas
Arroyo Del Cobre
Arroyo Seco
Arroyo Frijoles
Arroyo Chamisal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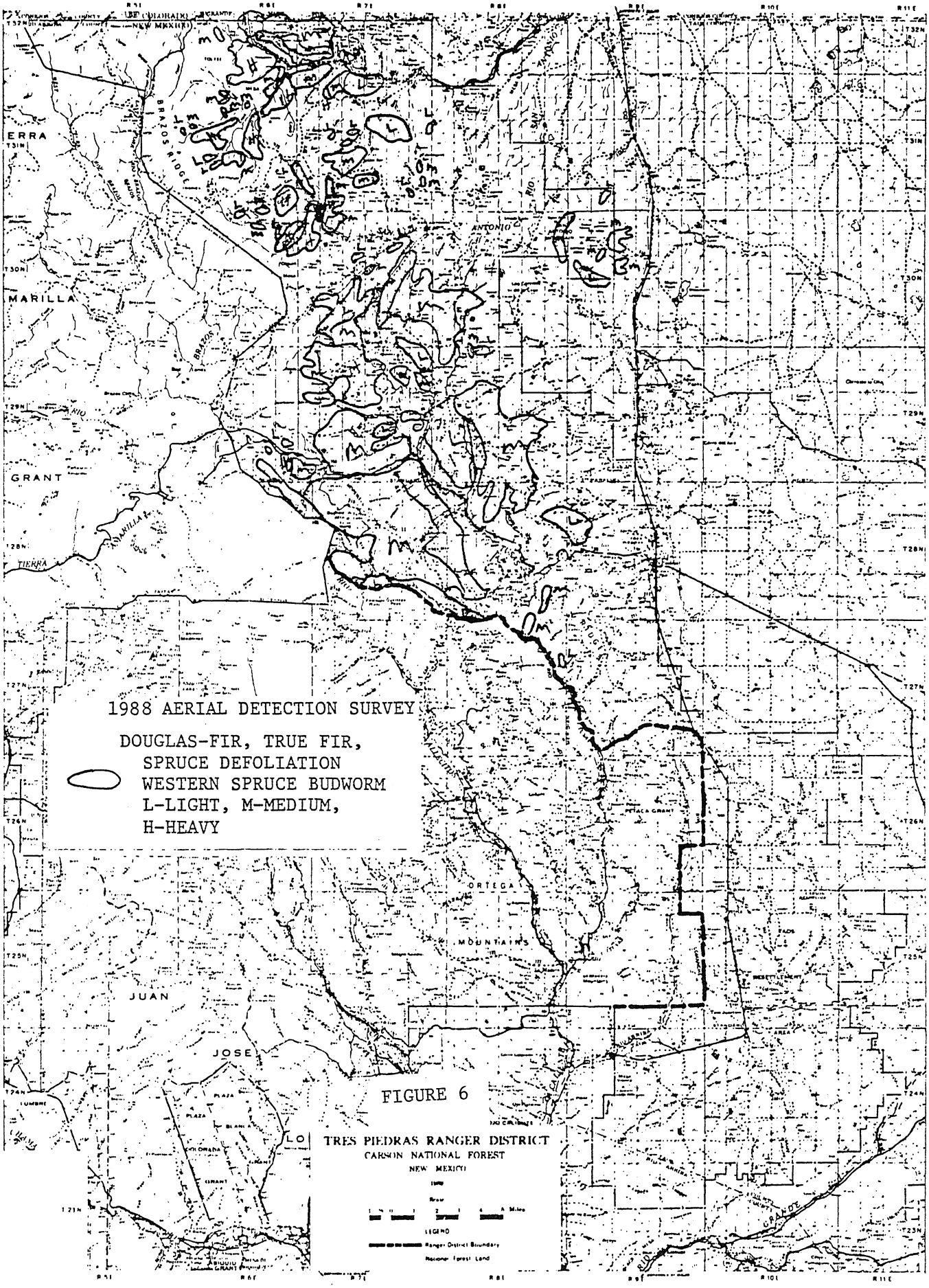
SPRUCE DEFOLIATION
WESTERN SPRUCE BUDWORM
L-LIGHT, M-MEDIUM,
H-HEAVY
EL RITO RANGER DISTRICT
CARSON NATIONAL FOREST
NEW MEXICO
1977
Scale
1 1/2 0 1 2 3 4 5 Miles
LEGEND
Ranger District Boundary
National Forest Land
R.5E.
R.6E.
R.7E.
R.8E.
R.9E.
T. 28 N.
T. 27 N.
T. 26 N.
T. 25 N.
T. 24 N.
T. 23 N.
PETACA GRANT
ORTEGA
MOUNTAINS
OJO CALIENTE
SANTA FE
NATIONAL
FOREST
ABIQUIU
GRANT
MESA DE
ABIQUIU
PLAZA
BLANCA
COLORADA
LOBATO
GRANT
SEVENTH
STANDARD
PARALLEL
MERIDIAN
NEW
NUTRITAS
CANJILON
MESA
RIO
CHAMA

FIGURE 5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Ranger District Boundary
National Forest Land
GRANT
ORTEGA
MOUNTAINS
JUAN
JOSE
BRAZOS RIDGE
ANTONIO
TIERRA

FIGURE 6